


## ORIGINAL ARTICLE

# The effect of using a mobile application (“WhiteTeeth”) on improving oral hygiene: A randomized controlled trial

Janneke F. M. Scheerman<sup>1,2,3</sup>  | Berno van Meijel<sup>1,4,5</sup> | Pepijn van Empelen<sup>3</sup> |  
Gijsbert H. W. Verrips<sup>3</sup> | Cor van Loveren<sup>2</sup> | Jos W. R. Twisk<sup>4,5</sup> | Amir H. Pakpour<sup>6,7</sup> |  
Matheus C. T. van den Braak<sup>2</sup> | Gem J. C. Kramer<sup>2</sup>

<sup>1</sup>Inholland University of Applied Sciences, Amsterdam, The Netherlands

<sup>2</sup>Academic Center for Dentistry Amsterdam, Amsterdam, The Netherlands

<sup>3</sup>TNO Research Group, Leiden, The Netherlands

<sup>4</sup>VU Medical Center Amsterdam, Amsterdam, The Netherlands

<sup>5</sup>Amsterdam Public Health Research Institute (EMGO), Amsterdam, The Netherlands

<sup>6</sup>Social Determinants of Health Research Center, Qazvin University of Medical Sciences, Qazvin, Iran

<sup>7</sup>Jönköping University, Jönköping, Sweden

## Correspondence

Janneke F. M. Scheerman, Department of Preventive Dentistry and Dental Hygiene, Academic Center for Dentistry Amsterdam (ACTA), Gustav Mahlerlaan 3004, 1081LA Amsterdam, The Netherlands.  
Email: [janneke.scheerman@inholland.nl](mailto:janneke.scheerman@inholland.nl)

## Abstract

**Objective:** To evaluate the effectiveness of the WhiteTeeth mobile app, a theory-based mobile health (mHealth) program for promoting oral hygiene in adolescent orthodontic patients.

**Methods:** In this parallel randomized controlled trial, the data of 132 adolescents were collected during three orthodontic check-ups: at baseline (T0), at 6-week follow-up (T1) and at 12-week follow-up (T2). The intervention group was given access to the WhiteTeeth app in addition to usual care ( $n = 67$ ). The control group received usual care only ( $n = 65$ ). The oral hygiene outcomes were the presence and the amount of dental plaque (AI-Anezi and Harradine plaque index), and the total number of sites with gingival bleeding (Bleeding on Marginal Probing Index). Oral health behaviour and its psychosocial factors were measured through a digital questionnaire. We performed linear mixed-model analyses to determine the intervention effects.

**Results:** At 6-week follow-up, the intervention led to a significant decrease in gingival bleeding ( $B = -3.74$ ; 95% CI  $-6.84$  to  $-0.65$ ) and an increase in the use of fluoride mouth rinse ( $B = 1.93$ ; 95% CI  $0.36$  to  $3.50$ ). At 12-week follow-up, dental plaque accumulation ( $B = -11.32$ ; 95% CI  $-20.57$  to  $-2.07$ ) and the number of sites covered with plaque ( $B = -6.77$ ; 95% CI  $-11.67$  to  $-1.87$ ) had been reduced significantly more in the intervention group than in the control group.

**Conclusions:** The results show that adolescents with fixed orthodontic appliances can be helped to improve their oral hygiene when usual care is combined with a mobile app that provides oral health education and automatic coaching. Netherlands Trial Registry Identifier: NTR6206: 20 February 2017.

## KEYWORDS

health behaviour, health promotion, mobile applications, oral hygiene index and oral hygiene, telemedicine